

Checkpoint 1: Assess Your Understanding, pages 26–28

1.1

1. **Multiple Choice** Which arithmetic sequence has $d = -8$ and

$$t_{10} = -45?$$

- (A) 27, 19, 11, 3, ... B. -8, -12, -16, -20, ...
C. -5, -13, -21, -29, ... D. -27, -19, -11, -3, ...

2. Write the first 4 terms of an arithmetic sequence with its 5th term equal to -4 .

Sample response: I chose a common difference of 2.

$t_5 = -4$; so t_4 is $-4 - 2 = -6$; t_3 is $-6 - 2 = -8$; t_2 is $-8 - 2 = -10$;
and t_1 is $-10 - 2 = -12$

My arithmetic sequence is: $-12, -10, -8, -6, \dots$

3. This sequence is arithmetic: $-8, -11, -14, \dots$

- a) Write a rule for the n th term.

Use: $t_n = t_1 + d(n - 1)$ Substitute: $t_1 = -8, d = -3$

$$t_n = -8 - 3(n - 1)$$

$$t_n = -5 - 3n$$

- b) Use your rule to determine the 17th term.

For t_{17} , use $t_n = -5 - 3n$ and substitute: $n = 17$

$$t_{17} = -5 - 3(17)$$

$$t_{17} = -56$$

4. Use the given data about each arithmetic sequence to determine the indicated values.

- a) $t_4 = -5$ and $t_7 = -20$; determine d and t_1

Use: $t_7 = t_4 + 3d$ Substitute: $t_7 = -20, t_4 = -5$

$$-20 = -5 + 3d$$

$$-15 = 3d$$

$$d = -5$$

Use: $t_1 = t_4 - 3d$ Substitute: $t_4 = -5, d = -5$

$$t_1 = -5 - 3(-5)$$

$$t_1 = 10$$

b) $t_1 = 3$, $d = 4$, and $t_n = 59$; determine n

Use: $t_n = t_1 + d(n - 1)$ Substitute: $t_n = 59$, $t_1 = 3$, $d = 4$

$$59 = 3 + 4(n - 1)$$

$$56 = 4n - 4$$

$$4n = 60$$

$$n = 15$$

5. The steam clock in the Gastown district of Vancouver, B.C., displays the time on four faces and announces the quarter hours with a whistle chime that plays the tune *Westminster Quarters*. This sequence represents the number of tunes played from 1 to 3 days: 96, 192, 288, . . . Determine the number of tunes played in one year.

In one year, there are 365 days and 96(365), or 35 040 quarters.
So, in one year, 35 040 tunes are played.

1.2

6. Multiple Choice For which series could you use $S_n = \frac{n(t_1 + t_n)}{2}$ to determine its sum?

A. $3 + 5 + 7 + 10 + 13 + 17 + 21$

B. $3 - 1 - 5 - 9 - 13 - 17 - 21$

C. $-3 - 5 - 8 - 10 - 13 - 15 - 18$

D. $3 - 1 + 5 - 3 + 7 - 5 + 9$

7. a) Create the first 5 terms of an arithmetic series with a common difference of -3 .

Sample response: I chose a first term of 7.

$t_1 = 7$; so t_2 is $7 - 3 = 4$; t_3 is $4 - 3 = 1$; t_4 is $1 - 3 = -2$; and

t_5 is $-2 - 3 = -5$

My arithmetic series is: $7 + 4 + 1 - 2 - 5 - \dots$

b) Determine S_{26} for your series.

Sample response:

Use: $S_n = \frac{n[2t_1 + d(n - 1)]}{2}$ Substitute: $n = 26$, $t_1 = 7$, $d = -3$

$$S_{26} = \frac{26[2(7) - 3(26 - 1)]}{2}$$

$$S_{26} = -793$$

8. Determine the sum of this arithmetic series:

$$-2 + 3 + 8 + 13 + \dots + 158$$

To determine n , use $t_n = t_1 + d(n - 1)$

Substitute: $t_n = 158$, $t_1 = -2$, $d = 5$

$$158 = -2 + 5(n - 1)$$

$$160 = 5n - 5$$

$$165 = 5n$$

$$n = 33$$

Use: $S_n = \frac{n(t_1 + t_n)}{2}$ Substitute: $n = 33$, $t_1 = -2$, $t_n = 158$

$$S_{33} = \frac{33(-2 + 158)}{2}$$

$$S_{33} = 2574$$

9. Use the given data about each arithmetic series to determine the indicated value.

- a) $S_{17} = 106.25$ and $t_{17} = 8.25$; determine t_1

Use: $S_n = \frac{n(t_1 + t_n)}{2}$ Substitute: $S_n = 106.25$, $n = 17$, $t_n = 8.25$

$$106.25 = \frac{17(t_1 + 8.25)}{2}$$

$$212.5 = 17t_1 + 140.25$$

$$17t_1 = 72.25$$

$$t_1 = 4.25$$

- b) $S_{15} = 337.5$ and $t_1 = -2$; determine d

Use: $S_n = \frac{n(t_1 + t_n)}{2}$ to determine t_{15} .

Substitute: $S_n = 337.5$, $n = 15$, $t_1 = -2$

$$337.5 = \frac{15(-2 + t_{15})}{2}$$

$$675 = -30 + 15t_{15}$$

$$705 = 15t_{15}$$

$$t_{15} = 47$$

Use: $t_n = t_1 + d(n - 1)$ Substitute: $t_n = 47$, $t_1 = -2$, $n = 15$

$$47 = -2 + d(15 - 1)$$

$$49 = 14d$$

$$d = 3.5$$